10/649,536

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re: Application of:	Group Art Unit: 1725
Applicant: Andrew Jeremiah Burns, et al.	Examiner: Heinrich, Samuel M.
Serial No.: 10/649,536	Atty. Docket: 2003P12748US
Filed: 08/26/2003	Confirmation No. 5435

Title: SEGMENTED THERMAL BARRIER COATING AND METHOD OF MANUFACTURING THE SAME

Mail Stop Appeal Brief - Patent
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

CERTIFICATE OF TRANSMISION UNDER 37 CFR 1.8

I hereby certify that this correspondence is being facsimile transmitted to the United States Patent and Trademark Office fax number 571-273-8300 on the date shown below.

This cover sheet (1 page)
Fee Transmittal form (1 page)
Appellants' Brief under 37 CFR 41.37 (12 pages)

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FEE TRANSMITTAL
For FY 2007

☐ Applicant claims small entity status See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT ($) 510.00

Complete if Known

Application Number	10/649,536
Filing Date	08/26/2003
First Named Inventor	Andrew Jeremiah Burns
Examiner Name	Samuel M. Heinrich
Art Unit	1725
Attorney Docket No.	2003P12748US

METHOD OF PAYMENT (check all that apply)

☐ Check ☐ Credit Card ☐ Money Order ☐ None ☐ Other (please identify): ____

☑ Deposit Account Deposit Account Number 19-2179 Deposit Account Name Siemens Corporation

For the above-identified deposit account, the Director is hereby authorized to: (check all that apply)

☑ Charge fee(s) indicated below ☐ Charge fee(s) indicated below, except for the filing fee

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FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES

	FILING FEES		SEARCH FEES		EXAMINATION FEES		
Application Type	**Fee ($)**	**Small Entity Fee ($)**	**Fee ($)**	**Small Entity Fee ($)**	**Fee ($)**	**Small Entity Fee ($)**	**Fees Paid ($)**
Utility	300	150	500	250	200	100	
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	
Provisional	200	100	0	0	0	0	

2. EXCESS CLAIM FEES

Fee Description	**Fee ($)**	**Small Entity Fee ($)**
Each claim over 20 (including Reissues)	50	25
Each independent claim over 3 (including Reissues)	200	100
Multiple dependent claims	360	180

Total Claims ____ - 20 or HP = **Extra Claims** ____ x **Fee ($)** ____ = **Fee Paid ($)** ____

HP = highest number of total claims paid for, if greater than 20.

Indep. Claims ____ - 3 or HP = **Extra Claims** ____ x **Fee ($)** ____ = **Fee Paid ($)** ____

HP = highest number of independent claims paid for, if greater than 3

Multiple Dependent Claims
Fee ($) ____ **Fee Paid ($)** ____

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper (excluding electronically filed sequence or computer listings under 37 CFR 1.52(e)), the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets ____ - 100 = **Extra Sheets** ____ / 50 = **Number of each additional 50 or fraction thereof** ____ (round up to a whole number) x **Fee ($)** ____ = **Fee Paid ($)** ____

4. OTHER FEE(S) **Fees Paid ($)**

Non-English Specification, $130 fee (no small entity discount)

Other (e.g., late filing surcharge): Filing a Brief in Support of an Appeal under 37 CFR 41.20(b)(2) 510.00

SUBMITTED BY

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Name (Print/Type)	John P Musone		Date 11/15/07

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SIEMENS

PATENT

Attorney Docket No. 2003P12748US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re: Application of: Group Art Unit: 1725

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Sir:

APPELLANT'S BRIEF UNDER 37 CFR 41.37

This brief is in furtherance of the Notice of Appeal filed in this application on 18 September 2007. A Fee Transmittal form PTO/SB/17 is transmitted concurrently with this paper to authorize the payment of the fee required for submittal of this brief.

1. REAL PARTY IN INTEREST - 37 CFR 41.37(c)(1)(i)

The real party in interest in this Appeal is the assignee Siemens Power Generation, Inc.

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2. RELATED APPEALS AND INTERFERENCES - 37 CFR 41.37(c)(1)(ii)

There is no other appeal, interference or judicial proceeding that is related to or that will directly affect, or that will be directly affected by, or that will have a bearing on the Board's decision in this Appeal.

3. STATUS OF CLAIMS - 37 CFR 41.37(c)(1)(iii)

Claims pending: 1-6, 8-11, 13-17, 36 and 37.

Claims cancelled: 7, 12, 18-35, 38 and 39.

Claims withdrawn but not cancelled: none.

Claims allowed: none.

Claims objected to: none.

Claims rejected: 1-6, 8-11, 13-17, 36 and 37.

The claims on appeal are 1-6, 8-11, 13-17, 36 and 37.

4. STATUS OF AMENDMENTS - 37 CFR 41.37(c)(1)(iv)

No amendment has been filed subsequent to the final rejection dated 18 June 2007.

5. SUMMARY OF THE CLAIMED SUBJECT MATTER- 37 CFR 41.37(c)(1)(v)

This invention relates generally to a method of manufacturing an insulated component wherein a ceramic thermal barrier coating of the component is formed to have a plurality of continuous gaps in its top surface to provide thermal strain relief.

The method of independent claim 1 is illustrated for one embodiment in FIGs. 4A and 4B and is described generally in the specification at page 9, line 23 through page 11, line 15. The method includes depositing a layer of ceramic insulating material 46 on a substrate surface; and forming a continuous gap 44 in a top surface 56 of the layer of ceramic insulating material to define segments therein, the continuous gap having a width at the top surface of less than 100 microns, as described at page 8, line 13. The method of claim 1 further includes forming the continuous gap by exposing the top surface 56 to a first pass of laser energy 48 having a first parameter to form the continuous gap, as described at page 10, lines 4-7; then exposing the

continuous gap to a second pass of laser energy 52 having a second parameter different than the first parameter to change a geometry of the continuous gap, as described at page 10, line 7 through page 8, line 9.

Dependent claim 16 adds the further limitations directed to a method that produces an insulated component having a second segmented layers of ceramic insulating material deposited over a first layer of segmented ceramic insulating material, as illustrated in FIG. 8 and as described generally in the specification at page 14, lines 12-29. The method includes forming a first plurality of continuous gaps in a top surface of a first layer 84, then depositing a second layer 86 of ceramic insulating material on the top surface of the first layer, and forming a second plurality of continuous gaps in a top surface of the second layer 86. In this embodiment the ceramic insulation is designed to fail preferentially along the interface between the layers, thereby exposing a fresh segmented layer of insulation to the operating environment.

6. GROUNDS OF REJECTION TO BE REVIEWED UPON APPEAL - 37 CFR 41.37(c)(1)(vi)

A. Claims 1-6, 8-11, 13-17, 36 and 37 are rejected under 35 USC 103(a) as being unpatentable over the four-way combination of USPN 5,951,892 (hereinafter Wolfa) in view of US20030209859A1 (hereinafter Young) and in view of USPN 6,443,813 (hereinafter Strom) and in view of USPN 6,676,878 (hereinafter O'Brien).

B. Claims 16, 17 and 36 are also rejected under 35 USC 103(a) as being unpatentable over the six-way combination of Wolfa in view of Young and in view of Strom and in view of O'Brien as applied to claim 1, and further in view of US 20030101587A1 (hereinafter Rigney) and in view of US20040266615A1 (hereinafter Watson).

7. ARGUMENT 37 CFR 41.37(c)(1)(vii)

A. Rejection of claims 1-6, 8-11, 13-17, 36 and 37; arguments applicable to all claims:

Independent claim 1 includes the limitations of "forming the continuous gap by: exposing the top surface to a first pass of laser energy having a first parameter to form the continuous gap; and exposing the continuous gap to a second pass of laser energy having a second parameter different than the first parameter to change a geometry of the continuous gap." Thus, it is the changing of a laser parameter from a first pass to a second pass within a single gap in order to change a geometry of the gap that is specified in claim 1. None of the cited prior art references nor their combination teaches or suggests the changing of a laser energy parameter from one pass to another in the same gap.

The Examiner recognizes that the primary Wolfa reference fails to teach the limitations of independent claim 1, so he relies on a combination with Young, Strom and O'Brien to show multiple passes of laser energy and multiple laser energy parameters. However, these additional references simply teach multiple passes of the same laser energy beam, or beams with different parameters being used in different gaps, yet these are not the limitations of claim 1 which require two passes in the same gap with a different laser parameter in the second pass in order to change a geometric shape of the gap that was formed by the first pass.

Young actually teaches away from claim 1 by describing a process wherein a laser beam with the same beam properties is used to make a plurality of passes as the beam is stepped along a seal ring face. Because the edges of the beam are rounded by a mask, they remove less material along the edges of the resultant groove/gap, so when two adjacent beam passes overlap, there is no danger of removing too much material in the overlap area. The control variable in Young is the amount of overlap between adjacent passes (paragraph 0015). The only change in laser beam parameters suggested in Young is from one gap to another gap. Young never teaches or suggests making two passes in a single groove/gap while changing a laser beam parameter on the second pass to change a geometry of that one gap. The Examiner has provided no citation within Young where different laser properties are used in the same gap. Thus, the addition of the teaching of Young with Wolfa fails to support the rejection of the claims under 35 USC 103.

Similarly, Strom also teaches away from the claimed limitations of changing of a laser parameter from a first pass to a second pass over the same gap because Strom describes a continuous side-by-side laser cutting path (column 5, lines 26-28) with unchanging laser parameters. Nowhere does Strom discuss changing the laser parameters from pass to pass. The Examiner has provided no citation within Strom where different laser properties are used in the same gap. Thus, the addition of Strom with the other references fails to support the rejection of the claims under 35 USC 103.

Finally, O'Brien describes a process of scanning a laser beam over a plurality of short segments rather than making a cut with one long continuous pass of laser energy. While O'Brien does mention at column 2, lines 64-66 that various laser parameters can be manipulated, a complete reading of O'Brien reveals no teaching or suggestion to change any such parameter from a first pass to a second pass within the same gap to change a geometry of the gap. The Examiner points to column 12, lines 27-41 of O'Brien as teaching "skilled persons will appreciate that it is possible to change laser parameters <u>during any given pass</u>." However, this does not teach or suggest the claim 1 limitation of changing a laser parameter <u>from one pass to another</u> within the same gap. Furthermore, when describing the embodiment of FIG. 10 at column 11, lines 7-25 where multiple passes are used, O'Brien specifically refers to a singular laser system output 32 as being used over many passes. Moreover, O'Brien acknowledges at column 16, lines 34-44 that laser parameters should be changed for different materials, but he makes no suggestion of changing such parameters from a first pass to a second pass in any given material. Finally, in the specific embodiments described by O'Brien, such as at column 15, line 56 through column 16, line 18, ranges of acceptable exemplary laser parameters are described for cutting silicon, but there is no teaching or suggestion that such parameters should be changed from pass to pass. To the contrary, column 16, lines 14-17 suggests that the parameters need only be changed for differing applications, such as for cutting different materials.

Thus, it is only the applicants' invention that teaches the changing of laser parameters from a first pass to a second pass within a single groove in order to change the gap geometry. The combination of cited prior art patents does not support the rejection of independent claim 1 or any of its dependent claims under 35 USC 103(a), and the rejections should be withdrawn.

B. Rejection of claims 16, 17 and 36; arguments applicable to all claims:

Claims 16 includes the limitations of "forming a first plurality of continuous gaps in a top surface of the first layer; depositing a second layer of ceramic insulating material on the top surface of the first layer; and forming a second plurality of continuous gaps in a top surface of the second layer." The resulting coating appears as illustrated in FIG. 8 of the present application with a grooved layer overlying another grooved layer. The Examiner appreciates that the four prior art patents cited against claim 1 fail to teach such limitations, so he adds the teaching of yet two more published patent applications, Rigney and Watson, in support of the rejection under 35 USC 103.

The Examiner states that "Both Rigney ... and Watson ... describe surface deposit of ceramic material, etching the surface, and again depositing and laser grooving the surface ..." It is not clear exactly what teaching of Rigney and Watson is being relied upon, because the Examiner has provided no specific line or page numbers or figure numbers wherein one may find a teaching of two layers of ceramic material with grooves or gaps formed into both layers. Contrary to the Examiner's assertion, neither Rigney nor Watson teach or suggest any overlying double grooved layers. The processes taught by Rigney and Watson provide grooves or gaps only in a top surface.

In the repair process of Rigney, an underlying bond coat is grooved to enhance the spallation resistance of an overlying ceramic thermal barrier coating (TBC). See for example the Abstract of Rigney. Rigney specifically teaches away from forming any groove in the top surface layer at paragraph 0015 where he states that the repaired coating is blended with respect to the surrounding TBC ceramic top coat in order to maintain surface uniformity and smoothness, as dictated for aerodynamics. Thus, Rigney fails to disclose a process including the limitations of claim 16.

Watson fails to describe any multiple layers of grooved material, but rather only multiple grooves in a single top layer, as illustrated in FIG. 1 of Watson, with no underlying grooved layer. The Examiner fails to provide any specific line or page numbers or figure number wherein there is a teaching of two layers of ceramic material with grooves or gaps formed into both layers.

Thus, it is only the Appellants' invention that teaches the limitations of claim 16. The addition of Rigney and Watson to the other four cited references fails to support the rejection of claim 16 and its dependent claims 17 and 36 under 35 USC 103 and these rejections should be withdrawn.

8. CLAIMS APPENDIX - 37 CFR 41.37(c) (1) (viii).

A copy of the claims involved in this appeal is attached as a claims appendix under 37 CFR 41.37(c) (1) (viii).

9. EVIDENCE APPENDIX - 37 CFR 41.37(c) (1) (ix)

None is required under 37 CFR 41.37(c) (1) (ix).

10. RELATED PROCEEDINGS APPENDIX - 37 CFR 41.37(c) (1) (x)

None is required under 37 CFR 41.37(c) (1) (x).

Respectfully submitted,

Dated: 11/16/2007

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APPENDIX OF CLAIMS ON APPEAL

1. A method of manufacturing an insulated component, the method comprising:

providing a substrate having a surface;

depositing a layer of ceramic insulating material on the substrate surface; and

forming a continuous gap in a top surface of the layer of ceramic insulating material to define segments therein, the continuous gap having a width at the top surface of less than 100 microns;

further comprising forming the continuous gap by:

exposing the top surface to a first pass of laser energy having a first parameter to form the continuous gap; and

exposing the continuous gap to a second pass of laser energy having a second parameter different than the first parameter to change a geometry of the continuous gap.

2. The method of claim 1, further comprising forming the continuous gap to have a width of less than 75 microns.

3. The method of claim 1, further comprising forming the continuous gap to have a width of less than 50 microns.

4. The method of claim 1, further comprising forming the continuous gap to have a depth that does not extend through an entire thickness of the layer of ceramic insulating material.

5. The method of claim 1, further comprising forming the continuous gap using a laser engraving process.

6. The method of claim 1, further comprising:

forming a first plurality of continuous gaps to a first depth into the top surface; and

forming a second plurality of continuous gaps to a second depth different than the first depth into the top surface.

8. The method of claim 1, wherein the second pass of laser energy has a wider beam footprint than that of the first pass of laser energy.

9. The method of claim 1, wherein the second pass of laser energy has a pulsation frequency that is greater than that of the first pass of laser energy.

10. The method of claim 1, further comprising forming the continuous gap using laser energy delivered through a fiber optic cable.

11. The method of claim 1, further comprising forming the continuous gap with a laser engraving process using a lens having a focal length of at least 160 mm in order to reduce accumulation of molten material splashed onto the lens during the laser engraving process.

13. The method of claim 1, further comprising forming a plurality of continuous gaps in the top surface at a spacing between adjacent gaps of less than 750 microns.

14. The method of claim 13, further comprising forming the plurality of continuous gaps in the top surface at a spacing between adjacent gaps of less than 500 microns.

15. The method of claim 13, further comprising forming the plurality of continuous gaps in the top surface at a spacing between adjacent gaps in a range of 500-750 microns.

16. The method of claim 1 further comprising:

providing a substrate having a surface;

depositing a first layer of ceramic insulating material on the substrate surface;

forming a first plurality of continuous gaps in a top surface of the first layer;

depositing a second layer of ceramic insulating material on the top surface of the first layer; and

forming a second plurality of continuous gaps in a top surface of the second layer.

17. The method of claim 16, further comprising forming each of the gaps in the top surface of the second layer to have a width at the top surface of less than 100 microns.

36. The method of claim 16, wherein the first plurality of continuous gaps defines a preferential failure interface between the layers of ceramic insulating material, and further comprising depositing the second layer of ceramic insulating material to a critical depth selected to allow the deposited ceramic insulating material to spall along the preferential failure interface in response to an expected thermal transient in order to present a fresh layer of the ceramic insulating material to a surrounding high temperature environment.

37. The method of claim 1, further comprising exposing the continuous gap to the second pass of laser energy to widen a bottom of the gap into a generally U-shaped bottom geometry.

EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

None.